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Columbia River Channel Improvement Study – Steps to Identify and Alleviate Fisheries Concerns

Environmental Roundtable discussions and comments received throughout the study have highlighted the public's and resource agencies' concerns about possible impacts that work connected with improvements to the Columbia River navigation channel might have on regional fisheries. The main concerns are: possible entrainment (capture) of fish during dredging; and, loss of habitat as a result of disposal activities. The Corps conducted studies prior to and during the Feasibility Study to address those concerns.

Entrainment

A four-year entrainment study was conducted using the Corps hopper dredge, *Essayons*, at the mouth of the Columbia River. Results of this study indicated that a variety of organisms were entrained, but the dominant species were estuarine or marine species. An evaluation of entrainment during hopper dredging in the upriver area of the navigation channel was done using the Corps hopper dredge, *Yaquina*, in May 1997. The original intent of the study was to sample during dredging operations, but the large grain sediment clogged the sampler. As a result, samples were taken with the dredge pumps running and the draghead just skimming the bottom. This method would over-estimate entrainment. Two juvenile salmon and one juvenile sturgeon were collected in 48 samples taken over a five-hour period.

A single entrainment study was completed in the Columbia River for a pipeline dredge operating in deep water near Portland at Columbia River Mile 102. Results of the study indicated that no juvenile salmon were entrained. When dredging was done at depths of 60 feet to 80 feet, however, where sturgeon are known to be abundant, about 2,000 juvenile sturgeon ranging in size from 30 to 50 centimeters (1+ inch) were entrained. Sturgeon mortality was estimated to be about 3.5 percent after passing through the dredge and into the return water pond. This would indicate that as long as fish could pass through the disposal site in the return flow water, the impact may be fairly minor. Sturgeon were entrained in only about 20 percent of the total area dredged and no sturgeon were entrained in the other areas sampled.

Habitat

The area along the shoreline and out to 20 feet deep is important to migrating juvenile salmon. The National Marine Fisheries Service (NMFS) concluded that some shoreline sites provide important habitat for migrating juvenile salmon by supporting populations of benthic invertebrates that provide a food source. They also have found that the shallow area just offshore of the shoreline sites provides escape habitat from predators and resting areas for juvenile salmonids. Consequently, in 1993, the NMFS approved disposal at only 14 shoreline sites. Those

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were among the most actively eroding, coarse grain sites that would be of least value to juvenile salmonids.

Studies sponsored by the Corps and performed by the NMFS were done in 1994 and 1995 to assess the biological productivity of 10 additional historic beach nourishment sites. The results of the study indicated that these sites were fairly productive for benthic invertebrates and, in particular, for *Corophium salmonis*, an important food item for juvenile salmonids. Mean densities of *Corophium* ranged from about 900 to 45,000 per square meter for the 10 sites. Densities were generally higher at the offshore station compared to the inshore station and were also two to three times higher in April than October. None of these sites has been used for some time and the habitat has reestablished, which may account for some of the higher abundance.

Shoreline disposal is proposed for only two locations, Miller Sands (O-23.5) and Sand Island (O86.2). Use of fewer shoreline disposal sites could have varying impacts on fisheries habitat depending upon the individual site. Some sites, particularly less erosive sites, would benefit from not being used since they could stabilize and productive habitat would be reestablished. Other more erosive sites would not stabilize and could become less valuable as they erode back to a steep sandbank or the mud banks that historically occurred along the river. Neither steep sandbanks or mud banks would provide habitat for *Corophium* which is as productive as the sand beach created from shoreline disposal. Consequently, the actual impact from not using a site may range from an increase in benthic communities to a loss of habitat and reduction in population depending on changes to the site's physical characteristics over the long term.

There are also concerns about deepwater habitat along the river. Studies have found that during all seasons only small numbers of salmon, sturgeon, and smelt use the navigation channel. White sturgeon, however, occur in higher abundance in areas over 65 feet deep. Disposal in these deep areas may smother some young-of-the-year and juvenile sturgeon, however most sturgeon would be able to avoid the disposal material. Over the first 20 years of the Channel Improvement Project, disposal could raise about 400 acres of riverbed that are now deeper than 65 feet by about 20 feet. Some of this area would remain deeper than 65 feet after disposal.

ESA Coordination

The Corps is aware of potential salmon impacts, and will coordinate with the NMFS and other federal and state agencies to minimize the potential impact of the project on salmon. Endangered Species Act (ESA) clearance will be required to construct the project and impacts to listed species and critical habitat will be evaluated during the consultation process. To obtain clearance, impacts will have to be minimized to the extent they do not adversely impact any of the listed stocks of salmon.